4.5 AIR QUALITY

4.5.1 Impact Methodology

Air quality impacts from the proposed alternatives have been evaluated in terms of emissions associated with the project alternatives. Emission sources associated with the Proposed Action include emissions from construction activities, ordnance use, engine emissions from military vehicle use, fugitive dust from vehicle travel on unpaved roads, wind erosion from areas disturbed by off-road vehicle maneuvers, and engine emissions from personal vehicle use associated with added personnel.

Construction emissions analyses used USEPA emissions data for off-road engines and vehicles (USEPA 1991), and generalized data for fugitive dust emissions from construction activity (USEPA 1995; California Air Resources Board 1997). Engine emissions from military vehicles have been estimated from USEPA data for off-road vehicles and engines (USEPA 1991). Fugitive dust emissions associated with tactical vehicle use have been based on USEPA methodologies for vehicle travel on unpaved roads (USEPA 1998). Fugitive dust emissions are those that do not pass through a confining pipe or stack. Emissions of wind-blown fugitive dust from areas disturbed by off-road vehicle maneuvers have been estimated using a proprietary wind erosion rate model and wind speed data from on-post meteorological stations. Emissions from personal vehicles have been estimated using an USEPA vehicle emission rate model. Because the number, size, duration, and intensity of accidental wildfires cannot be predicted with any accuracy, generalized estimates of emissions from wildfires are provided using USEPA data (USEPA 1995). Sections 5.5, 6.5, 7.5, and 8.5 provide more detailed emissions analyses that the summaries presented in this section. Further details are presented in Appendix G.

Particulate matter emissions analyses prepared for this EIS are presented as PM₁₀ estimates because that is the most appropriate size fraction to address for fugitive dust issues. PM₁₀ estimates presented for military and private vehicle engine emissions can be interpreted as also being a conservative estimate of PM_{2.5} emissions. Visible dust is a clear indication of airborne PM₁₀ concentrations that are typically in the range of several thousand micrograms per cubic meter. It takes only a few hours of such concentrations to produce a 24-hour average that exceeds the state and federal 24-hour average PM₁₀ standard of 150 micrograms per cubic meter. PM₁₀ emissions are important because they are easily airborne and are small enough to be inhaled deep into the lungs creating potential adverse health effects.

4.5.2 Factors Considered for Impact Analysis

Major factors considered in determining whether a project alternative would have a significant impact on air quality include the following:

 The amount of net increase in emissions per year of criteria pollutant on a given Island. The 100 tons per year Clean Air Act conformity de mininis threshold does not apply to Hawaii because it is an attainment area but was used as a basis of comparison in analyzing air quality impacts;

- Whether relatively high emissions would occur on a continuing basis for periods longer than the time frame of relevant ambient air quality standards (e.g., 8-hour periods for ozone precursors; 3-hour and 24-hour periods for sulfur oxides; 24-hour periods for PM_{10} ; etc.);
- Whether emissions of precursors to ozone or other secondary pollutants would occur in such quantities and at such locations as to have a reasonable potential to cause or contribute to a violation of federal or state ambient air quality standards; or
- Whether emissions of hazardous air pollutants could exceed state standards or other hazardous air pollutant exposure guidelines at locations accessible to the general public.

During the scoping process for this EIS, the public expressed general concerns regarding the potential for hazardous air pollutant emissions (primarily in connection with ordnance use), fugitive dust from vehicles traveling on unpaved roads and in maneuver areas, and the potential for wind erosion from areas disturbed by vehicle maneuvers.

4.5.3 **Summary of Impacts**

Table 4-4 lists the types of air quality impacts associated with the Proposed Action, Reduced Land Acquisition, and No Action at the relevant installations.

Table 4-4 Summary of Potential Air Quality Impacts

	SBMR			DMR			KTA			PTA			Project-wide Impact		
Impact Issues	PA	RLA	NA	PA	RLA	NA									
Emissions from construction activities	0	\odot	0	0	\odot	0	0	\odot	0	0	0	0	0	\odot	0
Emissions from ordnance use	0	\odot	\odot	0	\odot	\odot									
Engine emissions from military vehicle use	0	\odot	0	0	\odot	0	0	\odot	0	0	0	0	0	\odot	\odot
Fugitive dust from military vehicle use	\otimes	\otimes	\odot	\otimes	\otimes	\odot	\otimes	\otimes	0	\otimes	\otimes	\odot	\otimes	\otimes	\odot
Wind erosion from areas disturbed by military vehicle use	0	0	0	0	0	0	\otimes	\otimes	0	8	\otimes	0	\otimes	\otimes	0
Emissions from increased aircraft operations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Emissions from wildfires	0	\odot	\odot	0	\odot	\odot	0	\odot	0	0	\odot	\odot	0	\odot	\odot
Other emissions from personnel increases	0	\odot	\odot	0	0	0	0	0	0	0	0	0	0	\odot	0

This table summarizes project-wide impacts. For installation-specific impacts see Chapters 5–8.

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant = Beneficial impact NA = No Action

Significant but mitigable to less than significant N/A = Not applicable• Less than significant = Proposed Action

RLA = Reduced Land Acquisition

O = No impact

Proposed Action (Preferred Alternative)

Significant Impacts

Impact 1: Fugitive dust from military vehicle use. Vehicle travel on unpaved roads and in off-road maneuver areas would increase by 57 percent under the Proposed Action. The resulting net increase in PM₁₀ emissions in fugitive dust generated by the increased vehicle traffic would be about 1,736 tons (1,575 metric tons) per year, representing an 81 percent increase over No Action conditions. Net increases in fugitive dust from vehicle use would be 780 tons (708 metric tons) per year at SBMR, 211 tons (191 metric tons) per year at DMR, 315 tons (286 metric tons) per year at KTA, and 429 tons (390 metric tons) per year at PTA. Sources of fugitive dust associated with military vehicle traffic include vehicle convoys on military vehicle trails, vehicle maneuver training on gravel or dirt roads inside military installations, and off-road military vehicle maneuvers inside military installations.

Fugitive dust generated by military vehicle maneuver traffic inside military installations poses the greatest potential for creating either nuisance conditions at nearby off-post locations or localized violations of the state or federal 24-hour average PM₁₀ standards. Maneuver activity would tend to occur within relatively localized areas, and could last for periods of several hours. Also, off road use will remove vegetation and expose bare soil to wind erosion creating reoccurring exposure to high PM₁₀ levels during high winds.

Dust from convoy traffic on military vehicle trails between installations would be relatively sporadic in nature, with convoy traffic lasting for periods much shorter than the time frame of the relevant state and federal PM₁₀ standards. Consequently, dust from vehicle convoy traffic on military vehicle trails would be unlikely to produce high fugitive dust concentrations lasting long enough to create any violations of the 24-hour average PM₁₀ standards. Fugitive dust caused by convoy traffic on military vehicle trails between installations would be a relatively small component of overall fugitive dust generation by military vehicle use.

The substantial increase in fugitive PM₁₀ emissions from military vehicle use at SBMR, KTA, PTA and DMR, the likelihood of exceeding the federal 24-hour standard, and the potential impacts to quality of life to surrounding communities combined may result in a significant air quality impact at SBMR, KTA, PTA and DMR. Feasible mitigation measures are available to reduce the magnitude of this impact, especially for vehicles traveling on unpaved roads, but it is unlikely that the net increase in fugitive dust emissions can be reduced to a less than significant level.

<u>Regulatory and Administrative Mitigation 1.</u> No regulatory or administrative mitigations have been identified.

<u>Additional Mitigation 1.</u> Potential mitigation measures for this impact include:

- Apply a gravel cover to dirt roads and other open dirt areas;
- Pave dirt and gravel roads, parking lots, and other open dirt areas;
- Use periodic water spray applications to reduce dust generation from unpaved roads and other unpaved areas; and
- Periodically apply synthetic dust control treatments to unpaved roads and other unpaved areas.

Two basic approaches are available for reducing fugitive dust generation related to off-road vehicle maneuver areas:

- Rotate use among available areas in a manner that allows maintenance of reasonably complete vegetation cover; or
- Implement a vegetation reseeding program to re-establish vegetation cover between periods of vehicle maneuver activities.

Providing a gravel cover to dirt roads and other open dirt areas will reduce fugitive dust generation. Gravel produced by crushing local lava-derived rocks would have moderate dust content unless thoroughly washed. In addition, lava-derived gravel weathers relatively rapidly and is likely to fragment and crumble more readily than gravel produced from harder rocks. Thus, the resulting gravel surface would be expected to generate noticeable quantities of fugitive dust. Gravel treatments by themselves are unlikely to reduce dust generation to less than significant levels.

Asphalt or concrete paving would reduce dust generation from vehicle travel to less than significant impact level.

Water applications whenever road surface materials become dry would reduce fugitive dust emissions by 75 to 90 percent, but would require the use of substantial quantities of water. Required water quantities have not been estimated, but could become substantial over the course of a year. Consequently, the use of synthetic dust control chemicals might prove to be a more appropriate mitigation strategy. Periodic application of synthetic dust control chemicals has proven effective in controlling fugitive dust from unpaved roads and tank trails at other military installations (U.S. Army Environmental Center 1996). Initial dust control effectiveness is typically over 90 percent, but it declines over time. Control effectiveness values of over 50 percent generally can be expected for periods of 30 to 60 days under heavy use conditions. Army tests at Fort Hood and Fort Sill indicated that calcium chloride solutions were more effective and longer lasting than various synthetic polymers or calcium lignosulfonate. Use of chemical dust suppressants would be a feasible method to control fugitive dust from unpaved roads, parking lots, and similar well-defined dust sources.

Effective mitigation measures are more difficult to identify for off-road maneuver areas. Rotating maneuvers among available areas is effective only when those areas are substantially larger. Such activity rotation may be possible at PTA but probably could not be accomplished at other installations.

Vegetation reseeding programs normally would be linked with rotation of maneuver activities among available areas. The effectiveness of reseeding programs depends on having adequate germination and vegetation establishment periods between repeated disturbances. This may not be possible for the limited off-road maneuver areas available at installations other than PTA.

Implementing these mitigations, if coordinated with ITAM geographic information systems and erosion-control and revegetation programs, could reduce the magnitude of this impact, but it is unlikely that the impact could be reduced to a less than significant level at SBMR, DMR, KTA or PTA.

Impact 2: Wind erosion from areas disturbed by military vehicle use. Off-road vehicle activity can reduce or eliminate vegetation cover in affected areas, resulting in increased susceptibility to wind erosion. The amount of project-wide off-road vehicle activity would increase substantially under the Proposed Action. In addition, the area available for off-road vehicle maneuvers would increase from 8,843 acres (3,579 hectares) to 31,518 acres (12,755 hectares) at PTA. Most of the additional land that would become available for off-road vehicle maneuvers has a very high potential for wind erosion if vegetation cover is reduced. The introduction of off-road vehicle maneuver activity into areas currently used for cattle grazing would be expected to reduce vegetation cover and increase the extent of ground disturbance. Wind speed patterns at KTA and PTA provide considerable opportunity for wind erosion to occur at these installations. The project-wide net increase in PM₁₀ emissions from wind erosion would average 1,796 tons (1,629 metric tons) per year. Net increases in wind erosion would be small at SBMR and DMR, and most of the increase would occur at KTA and PTA. Wind erosion issues are of particular concern near the WPAA because soils in that area are derived from very low-density volcanic ash. In July 1999, a severe dust storm resulted from wind blowing over areas denuded of vegetation by a recent fire. The result was fugitive dust emissions at high enough levels to require temporary evacuation of residences at Waiki'i Ranch. The substantial increase in fugitive PM₁₀ emissions from wind blown dust at KTA and PTA, the likelihood of exceeding the federal 24-hour standard, and the potential impacts to quality of life to recreation users in the KTA vicinity and surrounding communities at PTA combined may result in a significant air quality impact at KTA and PTA. Mitigation of wind erosion impacts would likely require programs to maintain vegetation cover between episodes of off-road vehicle maneuver activity. It is unlikely that vegetation reseeding programs would be sufficiently effective to reduce the net increase in annual wind erosion to a less than significant level at all installations.

<u>Regulatory and Administrative Mitigation 2.</u> No regulatory or administrative mitigations have been identified.

<u>Additional Mitigation 2.</u> Potential mitigation measures for this impact include:

- Rotate use among available areas in a manner that allows maintenance of reasonably complete vegetation cover; or
- Implement a vegetation reseeding program to re-establish vegetation cover between periods of vehicle maneuver activities.

Rotation of maneuver activities among available areas is potentially effective when the available area substantially exceeds the area needed for individual exercise events. That appears to be the case for PTA. Activity rotations at PTA may be able to provide sufficient time for substantial vegetation recovery between repeated disturbances. The small size of vehicle maneuver areas at SBER and KTA may preclude effective activity rotation at those installations.

Vegetation reseeding programs normally would be linked with rotation of maneuver activities among available areas. The effectiveness of reseeding programs depends on having adequate germination and vegetation establishment periods between repeated disturbances. This may not be possible for the large off-road maneuver areas that would become available at PTA under the Proposed Action. The limited opportunity to use area rotations at other installations may preclude effective vegetation reseeding programs at KTA.

Less than Significant Impacts

Emissions from construction activities. The Proposed Action would include numerous construction projects at various installations, with construction activities occurring from 2004 into 2009. Nitrogen oxide emissions from construction equipment at SBMR would be 100 tons (91 metric tons) in 2004, 149 tons (135 metric tons) in 2005, and less than 58 tons (53 metric tons) per year from 2006 through the end of the construction period in 2009. Nitrogen oxide emissions from construction equipment at PTA would be 192 tons (174 metric tons) in 2005 and 184 tons (167 metric tons) in 2006. Construction emissions at DMR would be less than 57 tons (51 metric tons) per year for any pollutant. Construction emissions at KTA would be less than 22 tons (20 metric tons) per year for any pollutant. As noted in Section 3.5, federal ozone standards have not been exceeded in Hawai'i, and maximum ozone levels in recent years have been well below the current state and federal standard. Emissions of ozone precursors associated with construction projects under the Proposed Action would create too small a net increased in ozone precursor emissions to have a measurable effect on ozone levels and would not affect the attainment status of the area. Consequently, construction activities would have a temporary and less than significant air quality impact at any installation under the Proposed Action.

Emissions from ordnance use. Overall project-wide ordnance use by the 25th ID(L) would increase by about 25 percent under the Proposed Action. Approximately 96 percent of the annual ordnance use would consist of small arms ammunition (pistol, rifle, shotgun, and machine gun ammunition), each item of which has only a very small propellant charge. Ordnance items with explosive or pyrotechnic components (such as mortars, artillery, mines, demolition charges, smoke devices, flares, or blast simulators) would represent about four

percent of the annual ordnance use. Emissions from ordnance use have not been quantified. However, the literature on emissions from ordnance firing and detonations clearly establishes that the detonation process is fundamentally different from normal combustion processes in terms of generating air pollutant emissions. As noted in a recent USEPA publication (Mitchell and Suggs 1998), unconfined detonations are essentially a decomposition process in which molecular constituents are broken down into simpler byproducts, and molecules more complex than the starting molecules are not formed. Instead, most of the energetic material is converted into simple gaseous products such as carbon dioxide, carbon monoxide, water vapor, nitrogen gas, nitric oxide, and nitrogen dioxide. Based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emission quantities from ordnance use are very small and include only trace quantities of hazardous components. Emissions associated with ordnance use pose very little risk of creating adverse air quality impacts. Consequently, air quality impacts from munitions use under the Proposed Action are considered less than significant.

Engine emissions from military vehicle use. Project-wide military vehicle use would increase by over 50 percent under the Proposed Action. Based on the estimated mix of vehicle types and the estimated frequency of vehicle use, annual project-wide emissions from military vehicle use would increase by about 98 percent compared to No Action conditions. Nevertheless, the net increase in annual emissions would be too small to affect the attainment status of any installations. The pollutant with the highest estimated annual net increase in emissions would be nitrogen oxides, which would increase by 82 tons (75 metric tons) per year for all installations combined. Consequently, emissions from military vehicle use would be a less than significant impact under the Proposed Action.

Emissions from increased aircraft operations. The Proposed Action would not result in any meaningful change to existing Army helicopter flight operations in Hawai'i. Airfield improvements at WAAF and BAAF would accommodate increased use of fixed wing cargo aircraft (C-130 and C-17 aircraft) for transporting troops and equipment to PTA. The Shadow 200 UAV would be used during many training exercises at various installations under the Proposed Action. However, current patterns of helicopter flight activity would continue to be the dominant Army flight activity. The project-wide net increase in emissions resulting from added cargo aircraft and UAV flight activity would be small. Consequently, the increase in aircraft emissions under the Proposed Action would be a less than significant impact.

Emissions from wildfires. Tracers, flares, and pyrotechnics have the potential for starting wildfires on training range areas. The use of such munitions would increase somewhat under the Proposed Action, with a corresponding increase in the potential for wildfires. The relatively low frequency of wildfires and their typically small size result in only small quantities of emissions. Consequently, emissions from wildfires on range areas would be a less than significant impact under the Proposed Action.

Other emissions from personnel increases. The Proposed Action would increase the overall number of military personnel at SBMR by 810. This represents a 5.5 percent increase in combined

military and civilian personnel compared to No Action. Estimated emissions associated with the net increase in commute vehicle traffic would be approximately 8.2 tons (7 metric tons) per year of reactive organic compounds; 67 tons (61 metric tons) per year of carbon monoxide; 7.5 tons (7 metric tons) per year of nitrogen oxides; 0.05 ton (0.05 metric ton) per year of sulfur oxides; and 11.3 tons (10.3 metric tons) per year of PM₁₀. These emission quantities would be too small to affect the attainment status of the area. Consequently, emissions from increased commute traffic at SBMR would be a less than significant impact under the Proposed Action. Personnel would not increase at other installations.

Reduced Land Acquisition Alternative

Significant Impacts

Impact 1: Fugitive dust from military vehicle use. Vehicle numbers and estimated annual VMT by military vehicles would be essentially the same under Reduced Land Acquisition as discussed for the Proposed Action. Resulting PM₁₀ emissions in fugitive dust generated by the increased vehicle traffic would be somewhat higher than for the Proposed Action since off-road vehicle activity at SBMR would occur on a smaller area, resulting in less vegetation cover and higher dust generation rates. Net increases in fugitive dust from vehicle use would be 826 tons (749 metric tons) per year at SBMR, 211 tons (191 metric tons) per year at DMR, 315 tons (286 metric tons) per year at KTA, and 429 tons (390 metric tons) per year at PTA. The substantial increase in fugitive PM₁₀ emissions from fugitive dust from military vehicle use, the likelihood of exceeding the federal 24-hour standard, and the potential impacts to quality of life to recreation users and surrounding communities at SBMR, DMR, KTA, and PTA combined may result in a significant air quality impact under the Reduced Land Acquisition.

<u>Regulatory and Administrative Mitigation 1.</u> No regulatory or administrative mitigations have been identified.

<u>Additional Mitigation 1.</u> Fugitive dust mitigation measures for military vehicle use on unpaved areas would be the same as discussed for the Proposed Action.

Impact 2: Wind erosion from areas disturbed by military vehicle use. Wind erosion from vehicle maneuver areas would be nearly the same under Reduced Land Acquisition as discussed for the Proposed Action. The net increase in PM₁₀ emissions from wind erosion would be about 1,796 tons (1,629 metric tons) per year, mostly at KTA and PTA. The substantial increase in fugitive PM₁₀ emissions from fugitive dust from military vehicle use, the likelihood of exceeding the federal 24-hour standard, and the potential impacts to quality of life to those living near PTA or for recreationists near KTA combined may result in a significant air quality impact under the Reduced Land Acquisition.

<u>Regulatory and Administrative Mitigation 2.</u> No regulatory or administrative mitigations have been identified.

<u>Additional Mitigation 2.</u> Mitigation measures for wind erosion from areas disturbed by military vehicle use would be the same as discussed for the Proposed Action.

Less than Significant Impacts

Emissions from construction activities. Reduced Land Acquisition would require most of the same construction projects as discussed under the Proposed Action. QTR2, however, would be constructed at PTA instead of at SBMR. Nitrogen oxide emissions from construction equipment at SBMR would be 100 tons (91 metric tons) in 2004 and 126 tons (114 metric tons) in 2005. Nitrogen oxide emissions from construction equipment would be 213 tons (193 metric tons) in 2005 and 186 tons (169 metric tons) in 2006. Construction emissions at DMR would be less than 57 tons (51 metric tons) per year for any pollutant. Construction emissions at KTA would be less than 22 tons (20 metric tons) per year for any pollutant. Emissions of ozone precursors associated with construction projects under the Proposed Action would create too small a net increased in ozone precursor emissions to have a measurable effect on ozone levels and would not affect the attainment status of the area. Consequently, construction activities would have a temporary and less than significant air quality impact at any installation under the RLA Alternative.

<u>Emissions from Ordnance Use.</u> Ordnance use under Reduced Land Acquisition would be essentially the same as ordnance use under the Proposed Action. As discussed for the Proposed Action, emissions associated with ordnance use would pose very little risk of creating adverse air quality impacts, so air quality impacts from munitions under Reduced Land Acquisition are considered less than significant.

<u>Engine Emissions from Military Vehicle Use.</u> Military vehicle use under Reduced Land Acquisition would be essentially the same as that discussed for the Proposed Action. Because the project-wide net emissions increase would be too small to affect the attainment status of any installation, emissions from military vehicles would be a less than significant impact under Reduced Land Acquisition.

<u>Emissions from Increased Aircraft Operations</u>. Reduced Land Acquisition would have the same small effect on emissions from aircraft operations as that discussed for the Proposed Action, so the increase in aircraft emissions under Reduced Land Acquisition would be a less than significant impact.

<u>Emissions from Wildfires.</u> Reduced Land Acquisition would have essentially the same potential for wildfires as that discussed for the Proposed Action. As noted for the Proposed Action, emissions from wildfires would be a less than significant impact under Reduced Land Acquisition.

Other Emissions from Personnel Increases. Reduced Land Acquisition would have the same personnel increase as that discussed for the Proposed Action. Emissions from added commute traffic would be the same as that discussed under the Proposed Action. Because these emission quantities would be too small to affect the attainment status of the area, emissions from increased commute traffic at SBMR would be a less than significant impact under Reduced Land Acquisition.

No Action Alternative

Less than Significant Impacts

Emissions from ordnance use. Overall project-wide ordnance use under No Action would be about 21 percent less than under the Proposed Action. Based on the general nature of detonation processes and the very low emission rates that have been published in studies of munitions firing and open detonations, emissions associated with ordnance use pose very little risk of creating adverse air quality impacts. Consequently, air quality impacts from munitions use under No Action are considered less than significant.

Engine emissions from military vehicle use. The military vehicle fleet would remain at the current 659 vehicles under No Action. Estimated annual emissions from vehicle engine operations would be well too small to affect the attainment status of any installations. Consequently, military vehicle engine emissions would have a less than significant impact under No Action.

<u>Fugitive dust from military vehicle use.</u> Vehicle numbers and estimated annual use levels would remain at current conditions under No Action. Because existing conditions have not led to any known violations of state or federal ambient air quality standards, the fugitive dust from military vehicle use would have a less than significant impact under No Action.

Wind erosion from areas disturbed by tactical vehicle use. Vehicle maneuver activity would remain the same as current conditions under No Action. Because existing conditions have not led to any known violations of state or federal ambient air quality standards, wind erosion from disturbed areas would be a less than significant impact under No Action.

Emissions from increased aircraft operations. There would be no change in aircraft operations at WAAF or BAAF under No Action. Consequently, there would be no increase in aircraft emissions under No Action. Because there would be no change from current conditions and because current conditions have not created any known violations of state or federal ambient air quality standards, emissions from aircraft operations under No Action would have a less than significant impact on air quality.

<u>Emissions from wildfires.</u> There would be no change in the use of tracer rounds or pyrotechnics under No Action. The risk of wildfires on training ranges would remain the same as present conditions. Emissions from wildfires under No Action are unlikely to produce substantial air quality impacts in off-base areas. Consequently, emissions from wildfires on range areas are considered a less than significant impact under No Action.

Other emissions from personnel increases. There would be no changes in personnel numbers at SBMR under No Action. Emissions from commute traffic under No Action would remain the same as under current conditions. Because there would be no change from current conditions and because current conditions have not created any known violations of state or federal ambient air quality standards, emissions from these sources would have a less than significant impact under No Action.

No Impact

<u>Emissions from Construction Activities.</u> No construction projects are associated with No Action, so there would be no air quality impacts from construction under No Action.